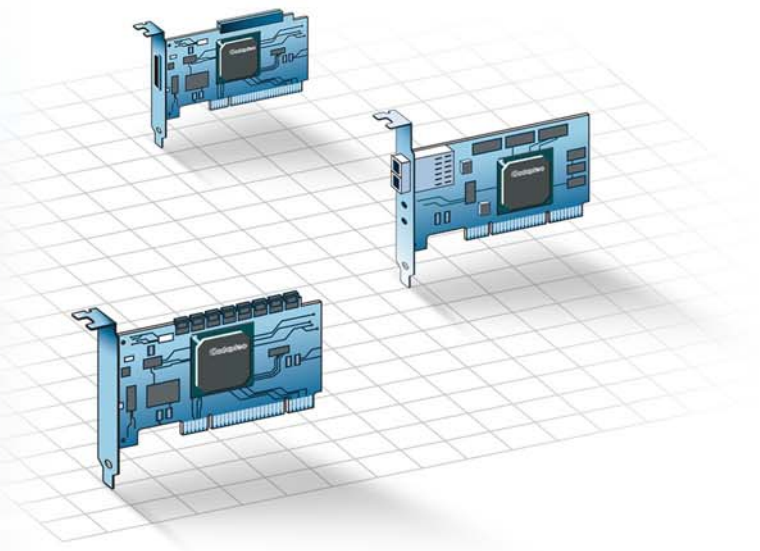
adaptec®

Adaptec SCSI Card 29320LPE

Installation and User's Guide



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- The TSID number is included on a white, bar-coded label, like this example:

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North America

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- For information about Adaptec's support options, call +1 408-957-2550,
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- You can order Adaptec cables online at www.adaptec.com/buy-cables.

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Regulatory Compliance Statements

Federal Communications Commission Radio Frequency Interference Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Adaptec, Inc. ASC-29320LPE

FC Tested to Comply
With FCC Standards

FOR HOME OR OFFICE USE

European Union Compliance Statement

This Information Technology Equipment has been tested and found to comply with EMC Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC, in accordance with:

- EN55022 (1998+A1:2000+A2:2003) Emissions
- EN55024 (1998+A1:2001+A2:2003) Immunity:
  - EN61000-4-2 (1995) Electrostatic discharge: ±4 kV contact, ±8 kV air
  - EN61000-4-3 (1996) Radiated immunity
  - EN61000-4-4 (1995) Electrical fast transients/burst: ±1 kV AC, ±0.5 kV I/O
  - EN61000-4-5 (1995) Surges ±1 kV differential mode, ±2 kV common mode
  - EN61000-4-6 (1996) Conducted immunity: 3 V
  - EN61000-4-11 (1994) Supply dips and variation: 30% and 100%

In addition, all equipment requiring U.L. listing has been found to comply with EMC Directive 73/23/EEC as amended by 93/68/EEC in accordance with EN60950 with amendments A1, A2, A3, A4, A11.

Australian/New Zealand Compliance Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to the Australian/New Zealand standard AS/NZS 3548 set out by the Spectrum Management Agency.

Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japanese Compliance (Voluntary Control Council Initiative)

This equipment complies to class B Information Technology equipment based on VCCI (Voluntary Control Council for Interface). This equipment is designed for home use but it may causes radio frequency interference problem if used too near to a television or radio. Please handle it correctly per this documentation.

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About This Guide

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In this chapter...

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This *Installation and User's Guide* provides information about using your Adaptec SCSI 29320LPE and SCSI devices, troubleshooting, SCSI termination, and a basic overview of SCSI technology. It explains how to use the built-in SCSISelect® utility if you need to view or modify your Adaptec SCSI card settings. It also explains how to install the software device drivers for your operating system.

What You Need to Know Before You Begin

You should be familiar with system hardware, data storage technology, and the input/output (I/O) technology—SCSI—used by your card.

You should also be familiar with Direct Attached Storage (DAS) and Storage Area Network (SAN) concepts and technology.

Terminology Used in this Guide

Because you can use your SCSI card to manage data storage in a variety of configurations from DAS to SAN, the generic term "storage space" is used to refer to the disk drives and devices being managed with SCSI*Select* described in this *Guide*.

Many of the terms and concepts referred to in this *Guide* are known to computer users by multiple names. This *Guide* uses these terms:

- Card (also known as Host Bus Adapter, or board)
- Disk drive (also known as hard disk, hard drive, or hard disk drive)
- Device (also known as a printers, tape drives, and so on.)

How to Find More Information

You can find more information about your SCSI card and the software and utilities included with it by referring to this document:

- *Readme.txt*—Includes updated product information and known issues; located on the SCSI Installation CD.

Kit Contents and System Requirements

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In this chapter...

Kit Contents 12

System Requirements 12

This chapter lists the contents of your SCSI card kit and the system requirements that must be met for you to successfully install and use your SCSI card.

Kit Contents

- Adaptec SCSI 29320LPE card with full-size bracket
- SCSI*Select* Utility (Embedded in the card's BIOS)—Used to view and modify your SCSI card and disk drive settings
- Installation CD
- Drivers for the Adaptec SCSI 29320LPE
- Product documentation for the Adaptec SCSI 29320LPE
- Readme Files
- 1 internal 68-pin high-density LVD cable with 6 positions and terminator
- Low-profile bracket
- *Adaptec SCSI 29320LPE Quick Start Guide* (printed)

System Requirements

- PC-compatible system with Intel Pentium, or equivalent, processor
- A motherboard with these features:
  - Complies with the PCIe Local Bus Specification, Revision 1.0.
- One of these operating systems:
  - Microsoft® Windows Server 2003, Windows XP
  - Red Hat® Enterprise Linux 4.0
  - SUSE Linux Enterprise Server 9.0, 10.0

    Note: For the latest on Adaptec's support of Linux, or to download driver sources, visit the Support area of the Adaptec Web site at www.adaptec.com.

  - Novell® NetWare® 6.5
  - SCO® OpenServer® 6.0
  - UnixWare®
  - Sun® Solaris™ 10
- At least 256 MB (or more) of RAM
- Available compatible PCIe slot
- 40 MB of free drive space
- 16-bit SVGA color monitor with a resolution of at least 800 x 600
- CD drive
- SCSI interface cables

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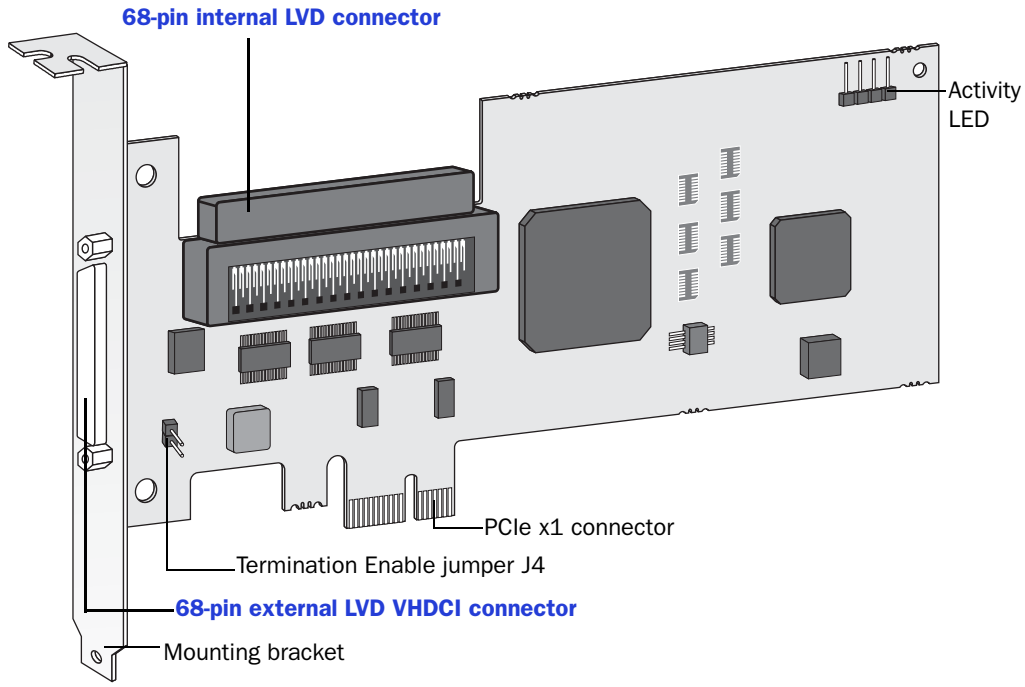
This chapter provides an overview of standard SCSI card features, and describes the unique features of your SCSI card.

SCSI Card Features

- PCIe compatibility
- Programmable SCSI card BIOS ROM - 1 MB (Flash upgradeable)
- Support for LVD (Ultra320, Ultra160, or Ultra2) SCSI devices

About the Adaptec SCSI 29320LPE

The Adaptec 29320LPE is a low-profile single channel PCIe x1 Ultra320 SCSI card with these features:



Form factor	Low-profile
PCI compatibility	PCIe x1
Channels	Single
Connectors	1 internal 68-pin high density LVD connector 1 external VHDCI 68-pin LVD connector
Disk drives/Devices	to 15
Active termination	Yes
Programmable SCSI card BIOS ROM	Yes

Understanding SCSI

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This chapter provides useful information on using the Adaptec SCSI Card and your SCSI devices. For more information about a specific SCSI device, refer to the documentation for that device.

What is SCSI?

SCSI (pronounced "scuzzy") stands for Small Computer Systems Interface. SCSI is an industry standard computer interface for connecting SCSI devices (such as a disk drive, CD-ROM drive, or scanner) to a common SCSI bus.

A SCSI bus is an electrical pathway that consists of a SCSI card installed in a system and one or more SCSI devices. SCSI cables are used to connect the devices to the SCSI card.

For the SCSI bus to function properly, a unique SCSI ID must be assigned to the SCSI card and each SCSI device connected to it, and the SCSI bus must be properly terminated.

SCSI IDs

Each device attached to an Adaptec SCSI Card, as well as the Adaptec SCSI Card itself, must be assigned a unique SCSI ID number from 0 to 15 for each of the two SCSI buses. A SCSI ID uniquely identifies each SCSI device on the SCSI bus and determines priority when two or more devices are trying to use the SCSI bus at the same time.

Refer to the device's documentation to set the SCSI ID. Here are some general guidelines for SCSI IDs:

- For internal SCSI devices, the SCSI ID is set by configuring a jumper on the device.
- For external SCSI devices, the SCSI ID is set with a switch on the back of the device.
- SCSI ID numbers do not need to be sequential, as long as the Adaptec SCSI Card and each device has a different number. For example, on each of the two SCSI buses you can have an internal SCSI device with ID 0, and an external SCSI device with ID 6.
- SCSI ID 7 has the highest priority on the SCSI bus. The priority of the remaining IDs are in descending order: 6 to 0, then 15 to 8.
- The Adaptec SCSI Card is preset to SCSI ID 7 and should not be changed. This gives the card the highest priority on the SCSI bus.
- Most internal SCSI disk drives come from the factory preset to SCSI ID 0.
- If you have 8-bit (or Narrow) SCSI devices, they must use SCSI IDs 0, 1, 2, 3, 4, 5, or 6. SCSI ID 0 is recommended for the first SCSI disk drive.
- If you are booting your system from a SCSI disk drive connected to the Adaptec SCSI Card, the Boot SCSI ID setting in the SCSI*Select* utility must correspond to the SCSI ID of the device from which you are booting. By default, the Boot SCSI ID is set to 0. We recommend that you do not change this setting.
- With the SCSI*Select* disk utility feature, you can confirm/view which SCSI ID is assigned to each device. See *Configuring the Adaptec SCSI Card with SCSISelect* on page 34.

Terminating the SCSI Bus

To ensure reliable communication on the SCSI bus, the ends of the SCSI bus must be properly terminated. This is accomplished when the device at the end of each cable, or the end of the cable itself, has a terminator installed (or enabled). Terminators must be removed, or termination must be disabled, on devices between the ends of each cable.

Since the method for terminating a SCSI device can vary widely, refer to the device's documentation for instructions on how to enable or disable termination. Here are some general guidelines for termination:

- Internal Ultra320, Ultra160, and Ultra2 SCSI LVD devices come from the factory with termination disabled and cannot be changed. Proper termination for these internal devices is provided by the built-in terminator at the end of the 68-pin internal LVD SCSI cable.
- Termination on SE internal SCSI devices is usually controlled by manually setting a jumper or a switch on the device, or by physically removing or installing one or more resistor modules on the device.
- Termination on most external SCSI devices is controlled by installing or removing a SCSI terminator. However, termination on some external SCSI devices is enabled or disabled by setting a switch on the back of the SCSI device.
- By default, termination on an Adaptec SCSI Card itself is set to Automatic (the preferred method). We recommend that you do not change this default setting. This automatic setting is just for the Adaptec SCSI Card itself; the card cannot change the termination setting on a device.
- Internal and external Ultra320, Ultra 160, and Ultra2 SCSI LVD SCSI buses must be terminated with an LVD terminator. This is sometimes referred to as an LVD terminator or a Multi-Mode terminator.

Using SCSI Devices

Using SCSI Disk Drives

If you connect a SCSI disk drive to an Adaptec SCSI card that was previously connected to a different SCSI card, it is recommended that you low-level format the drive before you can use it. Back up the data on the drive before moving the drive to the new SCSI card and before you format the drive. (See*Using SCSI Disk Utilities* **on page 43** for information on using the SCSI*Select* format utility.)

Caution: A low-level format destroys all data on the drive. Be sure to back up the data before performing a low-level format.

Every SCSI disk drive must be physically low-level formatted, partitioned, and logically formatted before it can be used to store data. For instructions on how to partition and format your SCSI disk drives, refer to your operating system documentation.

Using Ultra320 and Ultra160 Disk Drives

Adaptec recommends that you connect your LVD (Ultra 320, Ultra160, and Ultra2) SCSI devices to one SCSI Channel (bus) and your non-LVD SCSI devices (if any) to a separate SCSI Channel (bus). This allows the LVD SCSI devices to run at their maximum performance levels of 320 MB/sec, 160 MB/sec. or 80 MB/sec. If you combine LVD and non-LVD SCSI devices on the same SCSI channel, the data transfer rate of the LVD SCSI devices will drop down to non-LVD SCSI performance levels of up to 40 MB/sec.

Internal LVD SCSI devices come from the factory with termination disabled and cannot be changed. Proper termination is provided by the terminator at the end of the internal LVD SCSI cable.

Using SCSI Devices

If you connect SCSI devices (such as scanners, tape drives, zip drives, etc.) to your Adaptec SCSI Card, you must install the device manufacturer's proprietary software drivers. See your device's documentation for details.

Combining SCSI and Non-SCSI Devices

You can install an Adaptec SCSI Card in a system that already has a non-SCSI card, such as an ATA, SATA, or Serial Attached SCSI (SAS) controller. However, you cannot cross-connect the disk drives and other devices: SCSI devices must be connected to an Adaptec SCSI card, ATA devices must be connected to the ATA controller, and so on.

When you install an Adaptec SCSI Card and SCSI disk drives in a system that boots from a non-SCSI disk drive, the system will continue to boot from the non-SCSI disk drive unless you change the system's CMOS configuration. You do not need to change the configuration if you just want to use the SCSI drives for additional file storage space.

If your system's motherboard BIOS supports the BIOS Boot Specification (BBS) feature, you can select a different boot device without much difficulty. (To determine if the motherboard BIOS supports BBS, refer to the system documentation or contact your motherboard manufacturer.)

After you install the SCSI card and SCSI devices to use different kinds of disk drives in the same system, see the following table for recommendations.

Does computer BIOS support BBS?	Want computer to boot from SCSI drive?	Then do this:
NO	NO	No action required. SCSI drives and non-SCSI drives can be used together.
NO	YES	Run CMOS Setup program. Change primary disk drive setting to None or No Drives Installed (see system documentation). You will not be able to use the non-SCSI drive(s) at all when you boot from the SCSI drive.
YES	NO	No action required. SCSI drives and non-SCSI drives can be used together.
YES	YES	Run CMOS Setup program and select **SCSI drive** as boot device. SCSI drives and non-SCSI drives can be used together.

Installing Multiple SCSI Cards

You can install multiple SCSI cards in your system; you are limited only by the available system resources (for example, IRQ settings, I/O port addresses, BIOS addresses, and so forth).

Each SCSI card you install forms a separate SCSI bus with a different set of SCSI devices. SCSI IDs can be reused as long as the ID is assigned to a device on a different SCSI card (for example, each SCSI card can have a device with SCSI ID 2).

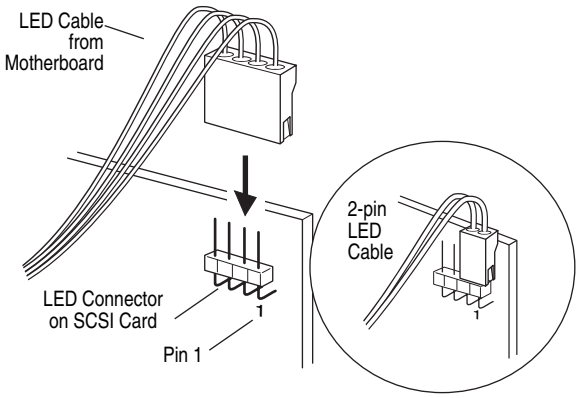
If you have two or more SCSI cards and your system boots from a SCSI disk drive, leave the SCSI card BIOS enabled on the SCSI card to which the boot disk drive is connected. Use SCSI*Select* to disable the SCSI card BIOS on the other SCSI cards.

If you have two or more SCSI cards, you can choose which SCSI card is found first by your system by physically changing the order of the SCSI cards in the PCIe/PCI/PCI-X slots. Your system scans the PCIe/PCI/PCI-X slots in a set order.

Connecting the LED Connector

(Optional feature) Most computers have an LED disk activity light on the front panel of the system case. If you choose to disconnect the cable from the LED connector on the motherboard and connect it to the LED connector on the SCSI card as shown in the figure below, the LED on the front panel of the system will light whenever there is activity on the SCSI bus.

Note: If you connect the LED cable to the SCSI card, the LED disk activity light will no longer indicate disk activity on the non-SCSI disk drives.

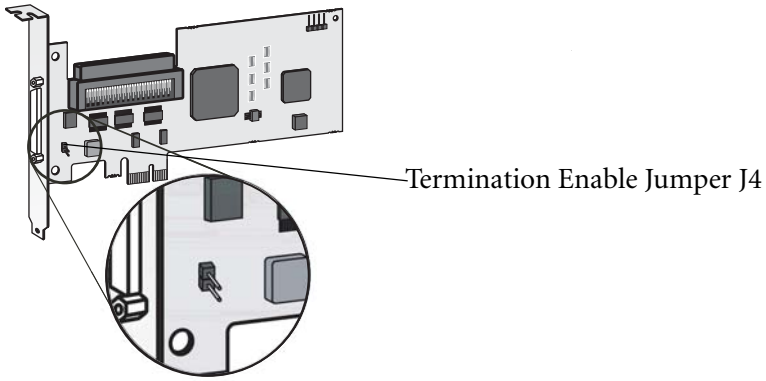


Overriding SCSI Termination Settings

You use SCSI*Select* to control the termination of the SCSI channel on an Adaptec SCSI Card. The default termination setting for a channel is Automatic. This setting allows the SCSI card to adjust SCSI termination automatically, depending on which connectors have SCSI devices attached to them.

Regardless of the SCSI*Select* termination setting, the SCSI card termination is always disabled when the power is turned off. If you want SCSI card termination to be enabled when the power is turned off, you must terminate the SCSI channel manually.

To manually terminate the channel on the Adaptec SCSI 29320LPE, place a shunt on the Termination enable jumper.The next figure shows where the jumper is located on Adaptec SCSI 29320LPE.



If you manually terminate the SCSI card with jumpers, you will override the SCSI*Select* setting. Making changes in SCSI*Select* will have no effect on termination when these jumpers are installed.

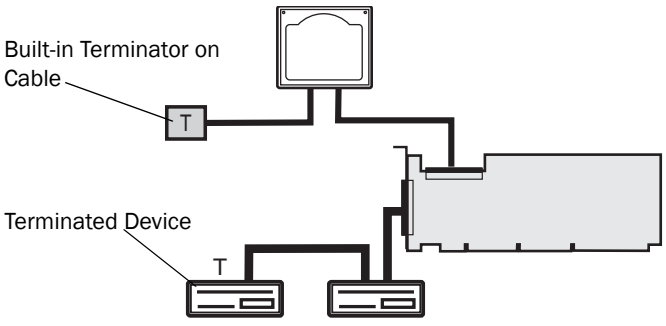
You might want to manually terminate the SCSI card if an Adaptec SCSI Card is connected to one or more external SCSI devices that are also connected to a SCSI card in another system. The devices can be shared between the two computers if one SCSI card is terminated when it is powered off, while the system with the other SCSI card is using the SCSI devices.

Connecting SCSI Devices

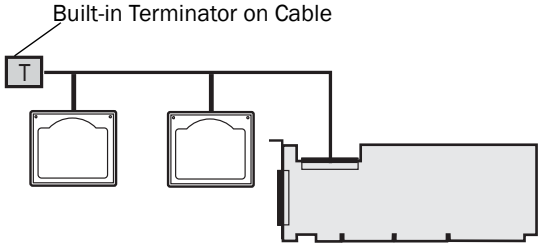
Here are some examples of how you can connect internal and external SCSI devices to an Adaptec SCSI Card. Attach the first device to the end connector of the cable (furthest from the SCSI card); attach other devices to the connectors that are closer to the SCSI card.

Adaptec SCSI Card 29320LPE

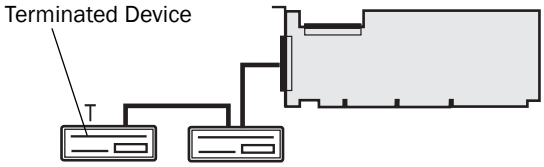
Here are some examples of how you can connect internal and external SCSI devices to the Adaptec SCSI 29320LPE card.



The following figure shows SCSI devices connected to the internal connector.



The following figure shows SCSI devices connected to the external connector.



Maximum Cable Lengths

The total length of cabling (internal and external) on the SCSI bus cannot exceed the maximum lengths listed in the following table. The third column lists the maximum number of SCSI devices you can connect to the SCSI card.

Maximum Cable Length	Data Transfer Rate	Maximum Devices Supported
25 m (82.0 ft)	Ultra320 SCSI (320 MB/sec) Ultra160 SCSI (160 MB/sec) Ultra2 SCSI (80 MB/sec)	1
12 m (39.4 ft)	Ultra320 SCSI (320 MB/sec)[1] Ultra160 SCSI (160 MB/sec) Ultra2 SCSI (80 MB/sec)	15
3 m (9.8 ft)	Fast Wide SCSI (20 MB/sec)	15
3 m (9.8 ft)	Fast SCSI (10 MB/sec)	7
3 m (9.8 ft)	Ultra SCSI (40 MB/sec for 16-bit, 20 MB/sec for 8-bit)	4
1.5 m (4.9 ft)	Ultra SCSI (40 MB/sec for 16-bit, 20 MB/sec for 8-bit)	5-7[2]

[1] Mixing Fast/Ultra devices with Ultra320/Ultra160 and Ultra2 SCSI devices causes the entire SCSI bus to default to Ultra SCSI speeds and cable length requirements.

[2] Ultra SCSI data transfer rates do not currently support more than seven devices connected to the SCSI card due to cable lengths.

Getting Started

5

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This chapter provides the basic information you need to set up your SCSI card and the devices you wish to attach. It also describes the options you have for installing your SCSI card and disk drives, and other SCSI devices.

Note: Before you begin, familiarize yourself with your SCSI cards physical features and the devices that it supports (see page 14).

Ultra320 SCSI on the Adaptec 29320LPE

The Adaptec SCSI 29320LPE is a single channel SCSI card with a maximum throughput of 320 MB/sec. Ultra320 is an enhanced SCSI technology that transfers data at up to 320 MB/sec. Ultra320 SCSI allows cable length of up to 12 meters for optimal connectivity and flexibility. See *About Your SCSI CARD* on page 13 for more information.

Note: For the best data I/O performance, Adaptec recommends that you keep your Low Voltage Differential (LVD) and non-LVD/SE devices separate. (LVD devices means Ultra320, Ultra160, and Ultra2 SCSI devices and non-LVD are Fast SCSI or Ultra SCSI devices.)

Device Drivers

An Adaptec SCSI card comes with a set of software device drivers and other files that enable it to communicate with your system.

For information on how to install the driver for an Adaptec SCSI card, refer to the section of this User's Guide that describes your specific operating system.

Selecting Cables

This section describes the cable options and requirements for your SCSI card. For information about cable lengths, see *Maximum Cable Lengths* on page 21.

SCSI Cables

One six-position Ultra320 SCSI LVD cable with terminator is included in the kit.

Depending on your requirements, you may need one 68-pin VHDCI external LVD SCSI cable (similar to the one shown below) for each external SCSI device you plan to connect.

External SCSI cable—Connects to an external SCSI disk drive or device.

Adaptec recommends using only high-quality Ultra320-rated cables with multimode terminators for all disk drives that share a channel with Ultra320 disk drives. Avoid poor quality cables, as they may degrade reliability. Do not use cables not rated for Ultra320 operation.

Adaptec recommends using only Adaptec SCSI cables. For more information or to purchase cables, visit the Adaptec Web site at www.adaptec.com.

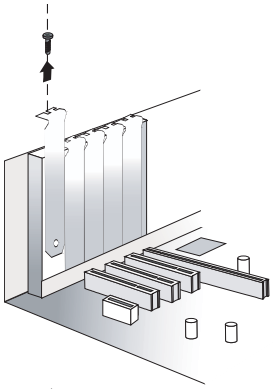
Before You Begin

- Read the safety information on page 45.
- Familiarize yourself with your SCSI card's physical features (see page 13).
- Ensure that you have the proper cables for your SCSI card and disk drives (see page 22).
- If you have a low-profile computer cabinet, replace the original full-height bracket with the low-profile bracket supplied in the SCSI card kit.
- Handle the SCSI card by its bracket or edges only.

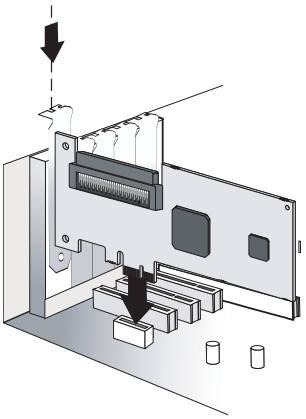
Installing the Adaptec SCSI Card

This section describes how to install your Adaptec SCSI card into your computer cabinet.

Caution: Electrostatic Discharge (ESD) can damage your SCSI card. Handle the SCSI card carefully so that you do not expose it to static charge.



1. If you have a low-profile computer cabinet, replace the original full-height bracket on the SCSI card with the low-profile bracket supplied in the SCSI card kit.
2. Turn off your system and disconnect the power cord.
3. Open the cabinet, following the manufacturer's instructions.
4. Insert the SCSI card into an available PCIe slot (compliant with PCIe rev. 1.0) and secure the bracket in the PCIe slot, using the retention device (for instance, a screw or lever) supplied with your system.
5. Install and connect any internal drives using the appropriate cable(s), then close the computer cabinet.



Note: If you connect non-LVD/SE (Wide Ultra/Ultra) SCSI devices to the same SCSI channel as LVD (Ultra320, Ultra160 and Ultra2) SCSI devices, the data transfer rate for the LVD SCSI devices will drop to non-LVD/SE performance levels. To achieve maximum data transfer rates for the LVD SCSI devices, be sure to keep them separate.

Connecting Disk Drives

1. Set the SCSI ID of each disk drive to a unique number between 0 and 15. The SCSI card is set to ID 7 by default. Although not recommended, you can change the SCSI card ID by using the SCSI*Select* utility (see page 34).

Note: Do not change the SCSI card ID unless absolutely necessary.

2. Install a terminator (or enable termination) on the disk drive at the end of each cable, or the end of the cable itself.

3 Remove any terminators (or disable termination) on disk drives between the ends of each cable.

4 Install your SCSI disk drives. If space inside your computer cabinet is limited, connect your disk drives to the SCSI cable before installing them. (For installation instructions, refer to your system's documentation.)

5 To avoid causing unstable operation, do not attach a cable to the SCSI card unless the other end of the cable is attached to a least one disk drive.

6 Alternatively, install your disk drives, then connect them to the SCSI card.

7 When all internal disk drives have been installed and connected, close your computer cabinet, reattach the power cord, then continue with the following section.

For more information about SCSI Devices, see *Understanding SCSI* on page 15.

Installing with an Operating System

1 Install and connect your SCSI card and devices (see page 24).

2 Install your operating system and the driver (see page 27).

Installing on an Existing Operating System

1 Install and connect your SCSI card and devices (see page 24).

If your SCSI card has an external connector, you can connect external disk drives as well (or instead).

2 Install the SCSI card driver (see page 31).

Uninstalling Your Adaptec 29320LPE

To uninstall your Adaptec SCSI Card 29320LPE:

1 Turn off your system and disconnect the power cord. Open the cabinet, following the manufacturer's instructions. Read the safety information on page 45.

2 Remove the SCSI card from the PCIe slot. Close the computer cabinet, reattach the system's power cord, then power on your system.

Note: The setup of some operating systems do not delete the device driver from your system disk; it only updates the software configuration information so that the device driver is no longer loaded during system startup.

Replacing a SCSI Card

The task of replacing one SCSI card with another is similar to the task of adding a SCSI card. When replacing a SCSI card, though, you add the new SCSI card before removing the old one.

Note: If you do not install the new SCSI card first, your operating system may fail to boot. If this happens, remove the new SCSI card and reinstall the original one.

To replace a SCSI card:

1 Turn off your system and disconnect the power cord. Open the cabinet, following the manufacturer's instructions. Read the Safety Information on page 45.

2 Leaving the existing SCSI card in place, install the new SCSI card, following the instructions provided *Installing the Adaptec SCSI Card* on page 24.

3 Power on your system.

4 If prompted, install the operating system driver.

5 If prompted, restart your system.

6 Ensure that the new SCSI card is functioning properly, then power off your system and disconnect the power cord. Open the cabinet, following the manufacturer's instructions. Read the Safety Information on page 45.

7 Disconnect any SCSI devices from the old SCSI card and transfer them to the new SCSI card.

8 Remove the old SCSI card from its PCI, PCI-X or PCIe slot. Close the computer cabinet, reattach the system's power cord, then power on your system.

Installing the Driver and an Operating System

6

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Installing with NetWare 29

This chapter explains how to install your SCSI card driver and an operating system.

Note: To install the driver on an existing operating system, see page 31.

Before You Begin

- Install and connect your Adaptec SCSI card and internal disk drives (see page 24).
- Create a driver disk (see the following section).

Creating a Driver Disk

Before you can apply a driver to your operating system installation, you will need to create a driver disk. To create the driver disk:

1. Within Windows, insert the Adaptec SCSI CD, the Main Menu will open.
2. Click **Create Driver Disk**, from the Main Menu.
3. Select one of the operating systems from this list:
   - Windows
   - Linux
   - NetWare
4. Select the type of operating system you want to use.
5. Select the version of the operating system.
6. When prompted, insert the floppy disk, then click **OK**.

   The system creates the driver disk.
7. Remove and label the driver disk.
8. Continue with the installation of the operating system and SCSI card driver, as described in the remainder of this chapter.

Installing with Windows

To install the SCSI card driver while installing Windows:

1. Insert your Windows CD, then restart the system.
2. Follow the on-screen instructions to begin the Windows installation.
3. When prompted to install a third-party driver, press **F6**.

   Note: When F6 is active, a prompt appears at the bottom of the screen for only 5 seconds. If you miss your chance to press F6, restart your system.
4. Insert the driver disk, then wait until prompted to install the driver. Press **S** to specify that the driver is on the floppy disk, then press **Enter**. The system reads the disk.
5. When the driver is found, press **Enter**. Follow the on-screen instructions to complete the installation.

   Note: Advanced users may use software parameters to alter the configuration of the Windows device drivers supplied by Adaptec. For more information on using advanced configuration parameters, see *Using Advanced Configuration Parameters* on page 48.

Installing with Red Hat Linux

To install the SCSI card driver while installing Red Hat Linux:

Note: For the most up-to-date information on Linux support, visit www.adaptec.com.

1. Insert the first Red Hat installation CD.
2. Restart the system.
3. When the Red Hat Welcome screen appears, type `linux dd` at the Boot: prompt.
4. When prompted, insert the driver disk, then select **OK**.
5. Follow the prompts to set up the environment you want.
6. If you are installing other third-party devices, install them now. Otherwise, select **Done**.
7. Continue with the Linux installation, according to the Red Hat instructions.

Installing with SUSE Linux

To install the SCSI card driver while installing SUSE Linux:

Note: For the most up-to-date information on Linux support, visit www.adaptec.com.

1. Insert the first SUSE Installation CD.
2. Restart your system.
3. When the SUSE installation selection screen appears, choose the type of installation you want, then ...

   For SLES 9.0: Press the **F6** key to indicate the use of a driver disk. (If **F6** is not shown on the screen, you may have an older version of SUSE; press the **Alt key** instead.)

   For SLES 10.0: Press the **F5** key and select **Yes** to indicate the use of a driver disk.
4. When prompted, insert the driver disk, then press any key to continue.
5. Follow the prompts to set up the environment you want.
6. If you are installing other third-party devices, install them now. Otherwise, select **Back**.
7. Complete the Linux installation, following the instructions included with your operating system.

Installing with NetWare

To install the SCSI card driver while installing NetWare:

1. Restart your system, then install NetWare. (For instructions, refer to your NetWare documentation).
2. To be able to load additional drivers later, select **Manual install mode** during the first part of the installation.
3. When the Device Drivers screen displays, check the storage adapters list, then select **Modify** to add another driver.
4. Select **Storage Adapters**, then press **Enter**.

5 If necessary, press the **Delete** key to remove the default SCSI driver.

6 Press **Insert** to add another driver.

The available drivers are displayed.

7 Insert the driver floppy disk.

8 Press the **Insert** key, then press **Enter** to scan the floppy disk drive.

9 Once the driver is selected, the new Device Driver is displayed.

10 Select **Return to Driver Summary**, then press **Enter**.

11 From the lower window menu, select **Continue**, then press **Enter**.

12 Follow the instructions in the NetWare manual to complete the installation.

Installing the Driver on an Existing Operating System

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Installing on NetWare 33

This chapter explains how to install your SCSI card driver on an existing operating system.

Note: To install the driver and an operating system, see page 27.

Before You Begin

- Install and connect your Adaptec SCSI card and internal disk drives (see page 24).
- Create a driver disk (see the following section).

Creating a Driver Disk

Before you can apply a driver to your operating system installation, you will need to create a driver disk. To create the driver disk:

1. Within Windows, insert the Adaptec SCSI CD, the Main Menu will open.
2. Click **Create Driver Disk**, from the Main Menu.
3. Select one of the operating systems from this list:
   - Windows
   - Linux
   - NetWare
4. Select the type of operating system you want to use.
5. Select the version of the operating system.
6. When prompted, insert the floppy disk, then click **OK**.

   The system creates the driver disk.
7. Remove and label the driver disk.
8. Continue with the installation of the operating system and SCSI card driver, as described in the remainder of this chapter.

Installing with Windows

To install the driver on Windows:

1. Start or restart Windows.

   The Found New Hardware Wizard opens and searches for the driver.
2. Insert the driver disk, select **Floppy drive**, then click **Next**.
3. Click **Next**, then click **Next** again.
4. Follow the on-screen instructions to complete the driver installation.
5. Remove the driver disk and restart your system if prompted.

Note: Advanced users may use software parameters to alter the configuration of the Windows device drivers supplied by Adaptec. For more information on using advanced configuration parameters, see *Using Advanced Configuration Parameters* on page 48.

Installing on Red Hat or SUSE Linux

To install the module on Red Hat or SUSE Linux:

1. Insert and mount the SCSI Installation CD:

   Red Hat: mount `/dev/cdrom /mnt/cdrom`

   SUSE: mount `/dev/cdrom /media/cdrom`

2. Install the module RPM:

   `rpm -Uvh mount-point/xxx/yyy.rpm`

   where *mount-point* is the specific mount point on the Linux system, *xxx* is the driver path, and *yyy.rpm* is the rpm file.

3. Reboot your system to ensure the driver loaded correctly.

4. Run fdisk, mkfs, and create mount points for any new disk drives.

Installing on NetWare

Before you begin, ensure that your NetWare operating system has been upgraded to the minimum patch level specified by Novell. Refer to the Novell Web site for more information.

To install the driver on NetWare:

1. Start your system.

2. At the NetWare server console prompt, type `load hdetect`, then press **Enter** if it has not be loaded automatically.

3. At the Device types menu, select **Continue**, then press **Enter**.

4. At the Device type option, select **Modify**, then press **Enter**.

5. Select **Storage Adapters**, then press **Enter**.

6. At the Additional Driver Options menu, select **Modify**, then press **Enter**.

7. At the Driver Name menu, press the **Insert key**.

8. Insert the driver disk, press the **Insert key**, then press **F3**.

9. At the A:\ prompt, press **Enter**.

   The driver installs.

10. At the Additional Driver Option menu, select **Return to driver summary**, then press **Enter**.

11. At the Driver type menu, select **Load** on Additional Driver Options.

12. After the driver loads, select **Continue**.

Configuring the Adaptec SCSI Card with SCSI*Select*

8

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SCSI*Select*, which is included with the Adaptec SCSI Card, enables you to change SCSI settings without opening the computer or handling the card. SCSI*Select* also enables you to low-level format or verify the disk media of your SCSI disk drives.

The following table lists the available and default settings for each SCSI*Select* option.

The default settings are appropriate for most systems and should not be changed. Run SCSI*Select* if you need to change or view current settings, or if you need to use the SCSI disk utilities.

SCSI*Select* Options	Available Settings	Default Setting
SCSI Bus Interface Definitions:		
SCSI card ID	0-15	7
SCSI card Parity	Enabled Disabled	Enabled
SCSI card Termination:	Automatic, Enabled, Disabled	Automatic
Boot Device Configuration Options—BBS Systems Only:		
Select Master SCSI card	A	A
Boot Device Configuration—Non-BBS systems Only:		
Select Master SCSI card	A	A
Boot SCSI ID	0-15	0
Boot LUN Number[1]	0-7	0
SCSI Device Configuration Options:		
Sync Transfer Rate (MB/sec)	320, 160, 80.0, 66.6, 40.0, 33.3, 20.0, 10.0, ASYN	320
Packetized	Yes, No	Yes (Enabled)
QAS	Yes, No	Yes (Enabled)
Initiate Wide Negotiation	Yes, No	Yes (Enabled)
Enable Disconnection	Yes, No	Yes (Enabled)
Send Start Unit Command	Yes, No	Yes (Enabled)
BIOS Multiple LUN Support [1]	Yes, No	No (Disabled)
Include in BIOS Scan [1]	Yes, No	Yes (Enabled)
Advanced Configuration:		
Reset SCSI Bus at IC Initialization	Enabled, Disabled	Enabled
Display <Ctrl> <A> Messages during BIOS Initialization	Enabled, Disabled	Enabled
Extended INT 13 Translation for DOS Drives > 1 GB	Enabled, Disabled	Enabled
Post Display Mode	Verbose, Silent, Diagnostic	Verbose
SCSI card INT 13 Support	Enabled Disabled: Scan Bus Disabled: Not Scan	Enabled
Domain Validation	Enabled, Disabled	Enabled
Support Removable Disks Under INT 13 as Fixed Disks [2]	Disabled, Boot Only, All Disks	Disabled
BIOS Support for Bootable CD-ROM [2]	Enabled, Disabled	Enabled

[1] Setting is valid only if Multiple LUN Support is enabled.

[2] Settings are valid only if the controller BIOS (SCSI card INT 13 Support) is enabled.

Starting SCSI*Select*

To start SCSI*Select*:

1. Turn on or restart your system.
2. During the startup process, pay careful attention to the messages that appear on your screen.
3. When the following message appears on your screen, press the **Ctrl-A** keys simultaneously (this message appears for only a few seconds):

   Press <Ctrl><A> for SCSI*Select* (TM) Utility!
4. Select **SCSI Channel**.
5. From the menu that appears, use the arrow keys to move the cursor to the option you want to select, then press **Enter**.

Exiting SCSI*Select*

To exit SCSI*Select*:

1. Press **Esc** until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).
2. At the prompt, select **Yes** to exit, then press any key to restart the system. Any changes you made in SCSI*Select* take effect after the system restarts.

Using SCSI*Select* Settings

To select an option, use the arrow keys to move the cursor to the option, then press **Enter**. In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing **Esc**.

To restore the original SCSI*Select* default values, press **F6** from the main SCSI*Select* screen.

SCSI Bus Interface Options

- **SCSI Card ID**—(Default: 7) Sets the SCSI ID for the SCSI card. The Adaptec SCSI Card is set at 7, which gives it the highest priority on the SCSI bus. Adaptec recommends that you do not change this setting.
- **SCSI Card Parity**—(Default: Enabled) SCSI cards perform parity checking to verify the accuracy of data transfer on the SCSI bus. Most currently available SCSI devices support parity checking. However, if a device on the SCSI bus does not support parity checking, disable this option. This setting changes parity for the entire SCSI card and the way it looks at each ID on that SCSI card. You cannot mix devices that do and do not support parity checking on the same SCSI bus.
- **SCSI Card Termination**—(Default: Automatic) Determines the termination setting for the SCSI card. The default setting is Automatic, which allows the SCSI card to adjust the termination as needed. Adaptec recommends that you do not change this setting.

SCSI Device Configuration Options

SCSI Device Configuration options can be set individually for each connected SCSI device.

Note: To configure settings for a SCSI device, you must know its SCSI ID (see *Using SCSI Disk Utilities* on page 43).

- **Sync Transfer Rate**—(Default: 320) Determines the maximum synchronous data transfer rate that the SCSI card supports. We recommend that you leave the maximum (default) value of 320 MB/sec.
- **Packetized**—(Default: Yes) Packetized protocol is required to operate at 320 MB/sec. When enabled, this option is available if it is implemented in the device drivers. However, this option is not supported by the BIOS.
- **QAS**—(Default: Yes) Quick Arbitration and Selection reduces the overhead of control release on the SCSI bus from one device to another. This improvement reduces command overhead and maximizes bus utilization. When enabled, this option is available if it is implemented in the device drivers. However, this option is not supported by the BIOS.
- **Initiate Wide Negotiation**—(Default: Yes) Enables the SCSI card to initiate Wide Negotiation with the SCSI target. When set to Yes, the SCSI card attempts 16-bit data transfer (wide negotiation). When set to No, the SCSI card uses 8-bit data transfer unless the SCSI device requests wide negotiation.

  Note: Set Initiate Wide Negotiation to No if you are using an 8-bit SCSI device that hangs or exhibits other performance problems with 16-bit data transfer rate enabled.

- **Enable Disconnection**—(Default: Yes) When set to Yes, Enable Disconnection allows the SCSI device to disconnect from the SCSI bus. When set to No, the SCSI device cannot disconnect from the SCSI bus. Leave the setting at Yes if two or more SCSI devices are connected to the SCSI card. When Enable Disconnection is set to No, the SCSI device cannot disconnect from the SCSI bus, packetized transfers cannot occur, and transfer rates are set at Ultra 160 levels.
- **Send Start Unit Command**—(Default: Yes) When set to Yes, sends the Start Unit Command to the SCSI device at bootup. This reduces the load on a system's power supply by allowing the SCSI card to turn on SCSI devices one-by-one when the system boots; otherwise, all SCSI devices turn on at the same time.

  Note: Check the device documentation to make sure the device supports the command. On most devices, you must also change a switch or jumper setting on the device to enable the device to respond to the command.

The following options have no effect if the SCSI card BIOS is disabled. (The SCSI card BIOS is normally enabled by default.)

- **BIOS Multiple LUN Support**—(Default: No) Leave this setting at No if the device does not have multiple LUNs. When set to Yes, the SCSI card BIOS provides boot support for a SCSI device with multiple LUNs (for example, a CD juke box device in which multiple CDs can be accessed simultaneously).
- **Include in BIOS Scan**—(Default: Yes) When set to Yes, the SCSI card BIOS controls the SCSI device if it is an INT 13 device (such as a SCSI disk drive) without device driver software. When set to No, the SCSI card BIOS does not control the SCSI device and device driver software is required. The BIOS can support up to eight INT 13 devices without an additional device driver.

Advanced Configuration Options

Caution: Do not change the Advanced Configuration Options unless absolutely necessary and you thoroughly understand the consequences of the change.

- **Reset SCSI Bus at IC Initialization**—(Default: Enabled) When set to Enabled, the BIOS resets the SCSI bus at POST time and then waits two seconds before scanning the bus for SCSI devices. If this option is disabled, the SCSI card BIOS does not issue a SCSI reset and there is no two-second delay.
- **Display <Ctrl><A> Messages during BIOS Initialization**—(Default: Enabled) When set to Enabled, the SCSI card BIOS displays the Press <Ctrl> <A> for SCSI*Select* (TM) Utility! message on your screen during system bootup. If this setting is disabled, you can still invoke the SCSI*Select* Utility by pressing <Ctrl> <A> after the SCSI card BIOS banner appears.
- **Extended INT 13 Translation for DOS Drives > 1 GByte**—(Default: Enabled) When set to Enabled, provides an extended translation scheme for SCSI hard disks with capacities greater than 1 GB. This setting is necessary only for current versions of MS-DOS; it is not required for other operating systems, such as NetWare or UNIX.

  Caution: Changing the translation scheme destroys all data on the drive. Be sure to back up your disk drives before changing the translation scheme.
- **Post Display Mode**—(Default: Verbose) During POST, the amount of information displayed depends on the mode. The following modes are available:
  - **Verbose**—The results of the SCSI bus scan are displayed, but the results of the PCIe bus scan are not displayed.
  - **Silent**—Nothing is displayed about POST, not even the Adaptec banner. However, error messages are displayed if there is a problem on the SCSI bus or SCSI devices.

    Caution: Setting this feature to Silent completely disables the messages displayed by the Adaptec Ultra320 SCSI card during the restart of the system. You will have to remember where in the POST cycle of the BIOS the Press Ctrl-A to enter SCSI*Select* message was displayed, and press Ctrl-A at that time to get into SCSI*Select*. If you press Ctrl-A too early or too late, you will not be able to enter into the card's setup.
  - **Diagnostic**—The PCI and SCSI bus scan results are displayed separately. There is a pause between PCI and SCSI scans.
- **SCSI Card INT 13 Support**—(Default: Enabled) This option controls the state of the BIOS at POST time. The following settings are available:
  - **Enabled**—Supports INT 13 for booting from a SCSI disk drive connected to the SCSI card. If you use this option, the following options are available:
    - Extended INT 13 Translation for DOS Drives > 1 GB
    - Support Removable Disks Under INT 13 as Fixed Disks
  - **Disabled:NOT Scan**—Set to this option if all the devices on the SCSI bus (for example, CD-ROM drives) are controlled by software drivers and do not need the BIOS, and you do not want the BIOS to scan the SCSI bus. SCSI*Select* remains available if needed.

- **Disabled:Scan Bus**—Set to this option if all the devices on the SCSI bus (for example, CD-ROM drives) are controlled by software drivers and you need the BIOS to scan the SCSI bus. Allows devices to spin up according to the setting of the Send Start Unit Command. SCSI*Select* remains available if needed.

The following options have no effect if the SCSI card BIOS is disabled. (The SCSI card BIOS is normally enabled by default.)

- **Domain Validation**—(Default: Enabled) Determines the optimal transfer rate for each device on the SCSI bus and sets transfer rates accordingly. When enabled, this option is available if it is implemented in the device drivers. However, this option is not supported by the BIOS. If you change this setting, the change automatically applies to both SCSI channels.
- **Support Removable Disks Under INT 13 as Fixed Disks**—(Default: Disabled) Determines which removable-media drives are supported by the SCSI card BIOS. The options are as follows:
  - **Disabled**— No removable-media drives running under DOS are treated as disk drives. Software drivers are required because the drives are not controlled by the BIOS.

    Caution: You may lose data if you remove a removable-media cartridge from a SCSI drive controlled by the SCSI card BIOS while the drive is on. If you want to be able to remove the media while the drive is on, install the removable-media software driver and set Support Removable Disks Under BIOS as Fixed Disks to Disabled.
  - **Boot Only**—Only the removable-media drive designated as the boot device is treated as a disk drive.
  - **All Disks**—All removable-media drives supported by the BIOS are treated as disk drives. This setting has no effect on drives under NetWare because NetWare automatically supports removable-media drives as disk drives.

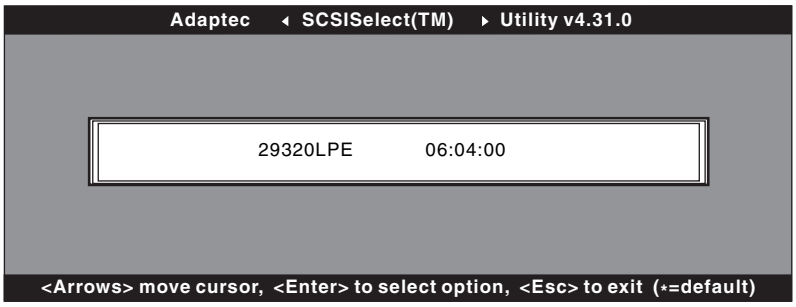
  Note: The Boot Only and All Disks options are available only if the SCSI card BIOS option is enabled.
- **BIOS Support for Bootable CD-ROM**—(Default: Enabled) When set to Enabled, the SCSI card BIOS allows the system to boot from a CD-ROM drive. If booting from a disk or other device, make sure no bootable CD is inserted, or disable this option.

Changing Configuration Settings

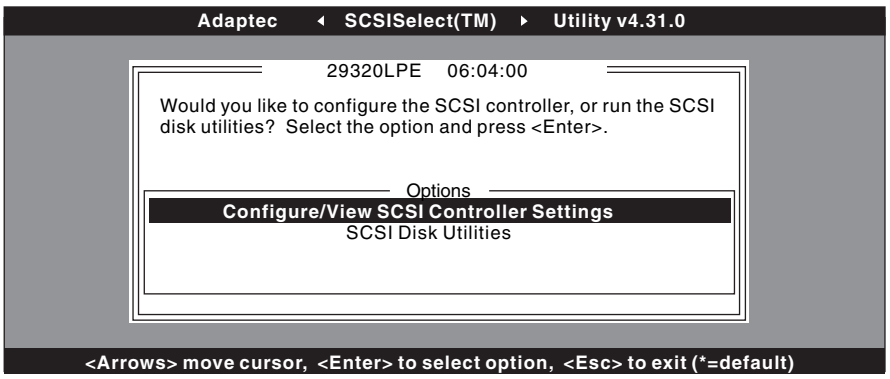
The factory default settings for Adaptec SCSI cards are correct for most computers. However, if you need to change the settings for the SCSI card or a SCSI device:

1. If you have not yet installed the SCSI card and the SCSI devices, do so now. Refer to your SCSI card Installation Guide for details.
2. Start SCSI*Select*. See *Starting SCSISelect* on page 36.

   SCSI*Select* detects all Adaptec SCSI cards and displays the model number, channel letter, slot number, and PCI address for each card and channel. Channels are listed separately.
3. Select the 29320LPE, then press **Enter**.

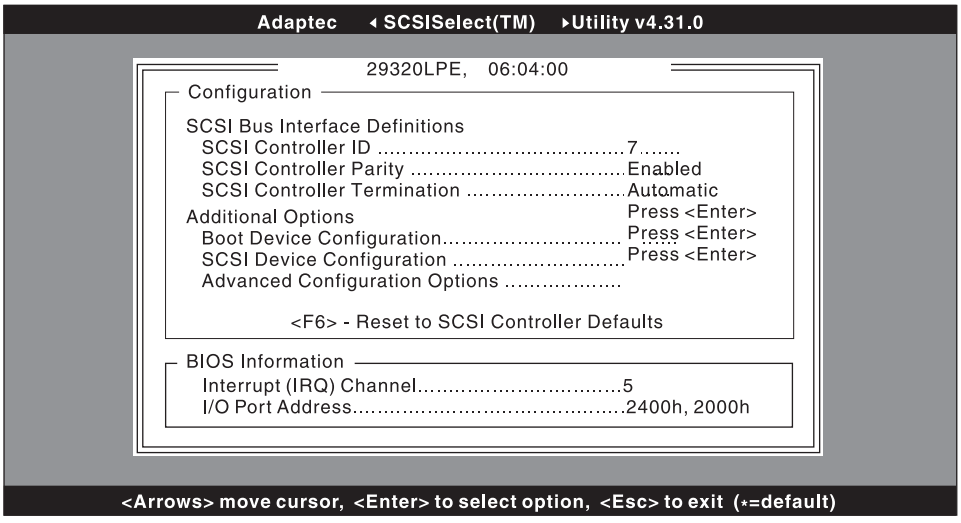


4 The Options menu appears. Select **Configure/View SCSI card Settings.** (For details see *Using SCSI Disk Utilities* on page 43.)



The Configuration menu appears. The Configuration menu displays the current settings for the SCSI bus interface. The BIOS Information section at the bottom of the menu displays the Interrupt (IRQ) channel and I/O Port Address of the selected device. This section cannot be modified.

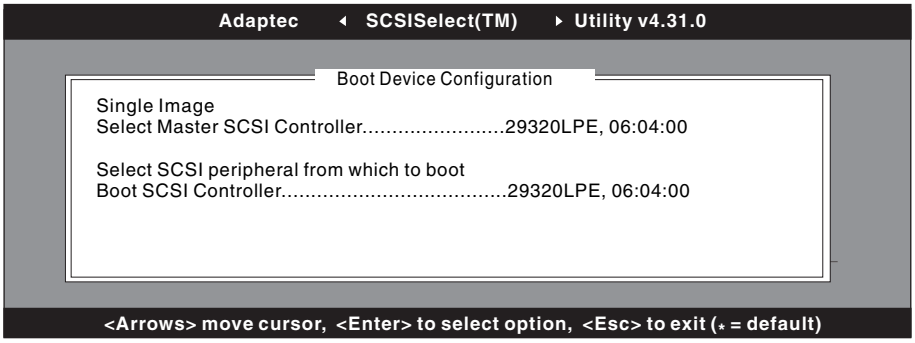
Note: Text displayed in yellow is for information only and cannot be selected.



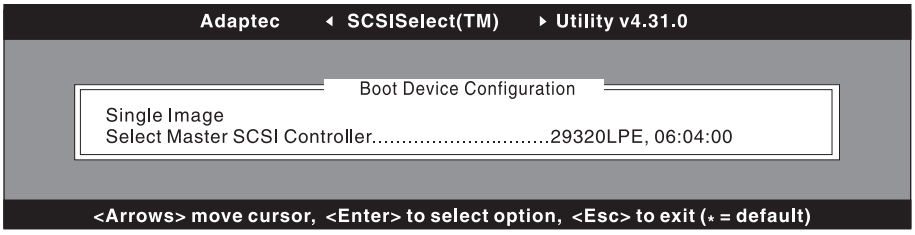
From the Configuration menu, you can access the following settings:

- Boot Device Configuration
- SCSI Device Configuration
- Advanced Configuration Options

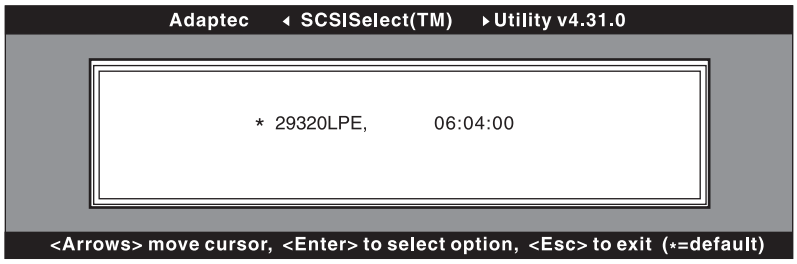
If you select **Boot Device Configuration**, the Boot Device Configuration menu appears. The non-BBS version is shown in the next figure. This menu displays and provides menu options for setting Master SCSI controller, Boot SCSI controller, Boot SCSI ID, and Boot LUN Number.



The BBS version of the Boot Device Configuration menu is shown in the next figure. This menu displays the Select Master SCSI card option only.

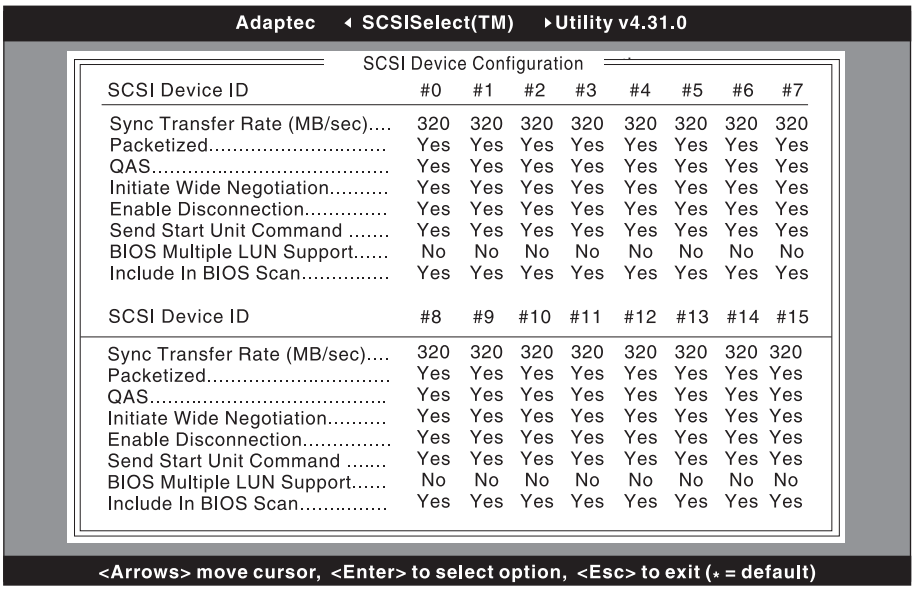


If you select **Select Master SCSI card** or **Boot SCSI card** (non-BBS systems only), the Master/Boot SCSI card Selection menu appears. The asterisk indicates the default master or boot SCSI card and channel.



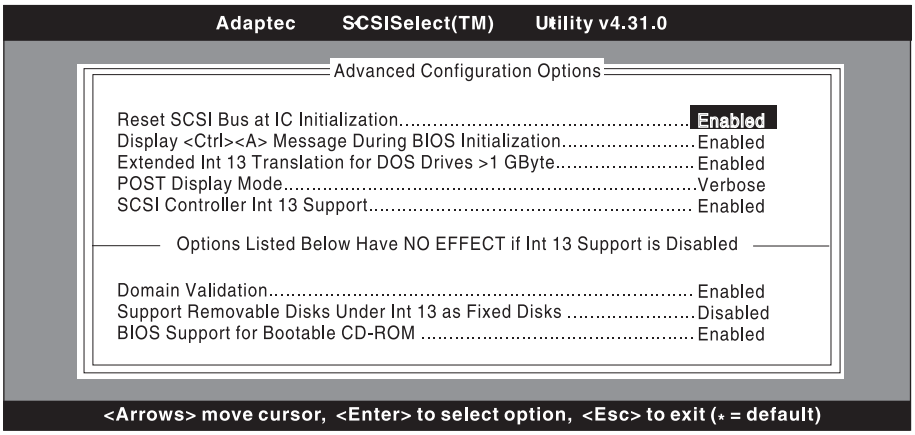
Note: Default settings are always marked with an asterisk. You can press **F6** to return all settings to the defaults.

If you select **SCSI Device Configuration**, the SCSI Device Configuration menu appears. This menu lists the current device settings for each SCSI ID, including IDs not assigned to a device.



If you do not know the SCSI ID of a device you want to configure, press **Esc** to get back to the Options menu. Then, select **SCSI Disk Utilities.** A list of SCSI devices and SCSI ID appears. Note the ID of the device you want to configure. Press **Esc** to redisplay the Options menu, select **Configure/View SCSI card Settings**, and then select **SCSI Device Configuration**.

If you select **Advanced Configuration Options**, the Advanced Configuration Options menu appears. To change a setting in the Advanced Configuration Options menu, select the setting. From the pop-up menu that appears, select a new setting.



5 When you are finished changing settings, press **Esc** until a message prompts you to save the changes. To save the changes, select **Yes.** To abandon the changes, then select **No.**

6 Press **Esc** until prompted to exit the utility, then select **Yes.**

The system prompts you if a restart is needed for your new settings to take effect. (Changing the Boot SCSI card setting or running the standalone SCSI utility forces an automatic restart.) Otherwise, your new settings take effect immediately.

Using SCSI Disk Utilities

The disk utilities provide options for:

- Listing SCSI IDs and LUNs
- Verifying or Formatting a disk

Listing SCSI IDs and LUNs

With SCSI*Select*, you can list the SCSI IDs of devices attached to the SCSI card. This enables you to quickly verify that no devices on the SCSI bus have duplicate IDs.

To view the SCSI IDs:

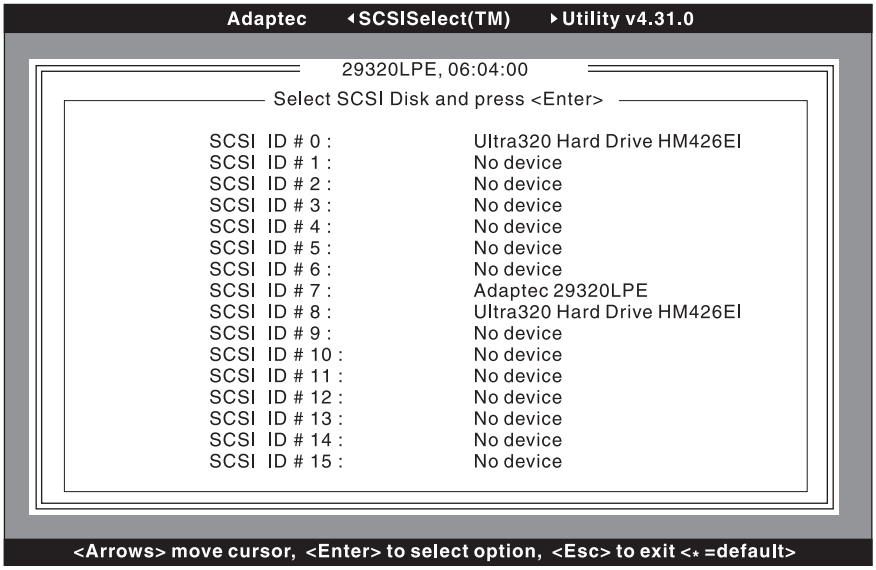
1. Start SCSI*Select*. See *Starting SCSISelect* on page 36.

   SCSI*Select* detects all Adaptec SCSI cards and displays the model number, channel letter, slot number, and PCI address for each SCSI card and channel.

2. Select the SCSI card and channel that has the devices you want to list. The Options menu appears.

3. Select **SCSI Disk Utilities**.

   SCSI*Select* scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the devices assigned to each ID.



   If a device does not show up in SCSI*Select*, check these items first:

   - Is the device attached to the SCSI cable?
   - Is there power to the device?
   - Does the device have a unique SCSI ID?

     If two devices are on the same ID and are on the same bus, only one device or neither of the devices may show up. To correct this, make sure that each device has a unique SCSI ID.

4. Use the ↑ and ↓ keys to move the cursor to a specific ID and device, then press **Enter**.

Verifying or Formatting a Disk

SCSI*Select* includes a utility that enables you to format and verify disks:

- **Verify Disk Media**—Allows you to scan the media of a disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them so they are no longer used.
- **Format Disk**—Allows you to perform a low-level format on a disk drive. A disk must be low-level formatted before you can use the operating system's partitioning and high-level formatting utilities. Most SCSI disk drives are preformatted at the factory and do not need to be formatted again. If a drive is not preformatted, you can use SCSI*Select* to perform a low-level format on the drive.This operation is compatible with most SCSI disk drives.

Caution: A low-level format destroys all data on the drive. Be sure to back up your data before performing this operation. You cannot abort a low-level format once it is started. When a low-level format command is sent to the disk drive, the drive will start its format. The SCSI card will not be in use and may appear to be hung. You must not interfere or try to stop the low-level format as this can destroy the disk drive and render it unusable. When the drive has completed its low-level format, it will send a command to the SCSI card and allow the user to exit the utility.

To use SCSI*Select* to format or verify a disk:

1. Start SCSI*Select*. See *Starting SCSISelect* on page 36.

   SCSI*Select* detects all Adaptec SCSI cards and displays the model number, channel letter, slot number, and PCI address for each card and channel.

2. Select the SCSI card and channel that has the devices you want to format or verify. The Options menu appears.
3. Select **SCSI Disk Utilities**. SCSI*Select* scans the SCSI bus and lists the SCSI IDs and associated devices on the SCSI bus.
4. From the list of SCSI devices, select the device you want to format or verify.
5. If the device has multiple logical units, a menu of LUNs appears. Select the LUN of the unit you want to format or verify. A small menu appears.
6. Select **Verify Disk Media** or **Format Disk**.
   - If you select Verify Disk Media, SCSI*Select* notifies you of bad blocks and prompts you to reassign them. Select **Yes** to reassign the bad blocks or No to leave them as is. You can press **Esc** at any time to abort verification.
   - If you select Format Disk, a prompt appears, asking you to confirm that you want to format the disk. Select **Yes** to start formatting the disk, or **No** to cancel formatting.

Safety Information

A

To ensure your personal safety and the safety of your equipment:

- Keep your work area and the system clean and clear of debris.
- Before opening the system cabinet, unplug the power cord.

Electrostatic Discharge (ESD)

Caution: ESD can damage electronic components when they are improperly handled, and can result in total or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis.

  If a wrist strap is not available, ground yourself by touching the metal chassis before handling the SCSI card or any other part of the system.

- Avoid touching the SCSI card against your clothing. The wrist strap protects components from ESD on the body only.
- Handle the SCSI card by its bracket or edges only. Avoid touching the printed circuit board or the connectors.
- Put the SCSI card down only on an antistatic surface such as the bag supplied in your kit.
- If you are returning the SCSI card to Adaptec, put it back in its antistatic bag immediately.

Technical Specifications

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DC Power Requirements 47

Current Requirements 47

Environmental Specifications

Operating temperature	0 °C to 55 °C
Relative humidity	10% to 90% (non-condensing)
Recommended Op-Humidity	40% to 60%@ 22 °C
Altitude	3,000m operating 4,500m non-operating

Note: Forced airflow is recommended, but not required.

DC Power Requirements

Ripple and noise	50 mV peak-to-peak (max)
DC Voltage	3.3 V ± 10%, 12 V ± 10%

Current Requirements

Adaptec Model	Maximum Current (A)
Adaptec SCSI 29320LPE	1.0 A @ 3.3 VDC; .20 A @ 12.0 VDC

Using Advanced Configuration Parameters

C

In this appendix...

Using Windows SCSI Parameters 49

Using Driver-specific Parameters 50

Advanced users may use software parameters to alter the configuration of the Windows device drivers supplied by Adaptec. All Windows configuration information is stored in a data structure supplied by Windows called the Registry. You can edit this information through a tool called the Registry Editor.

Caution: Do not edit your Registry unless it is absolutely necessary. If there is an error in your Registry, your system may become nonfunctional.

The following is a table of supported Windows Registry Settings.

Option Name	Default Value	Valid Value	Definition
/MAXTAGS=*nnn*	32	1-255	Specifies tagged command queue depth per target.
/INSTR_ERRLOG_Z=*nnn*	32	0-127	Specifies the length of the instrumentation error log.
MaximumSGList	65	2-255	Sets the maximum transfer size for an individual command.
MaximumLogicalUnit	32	0-31	Limits the scan for connected devices on the SCSI bus.
NumberOfRequests	255	16-255	Specifies the maximum number of commands that can be delivered to an SCSI card.

Using Windows SCSI Parameters

Follow the instructions below to enter the registry values that affect how the Windows SCSI manager interprets the generic configuration information of SCSI device drivers. Each driver has its own key reference in the Registry. In these instructions, the Ultra320 key is used (adpu320). All SCSI cards supported by the modified key are affected by the values you enter here. A list of valid values follows:

Note: The following value keys are case-sensitive and must be entered exactly as shown.

- **MaximumLogicalUnit**—This can limit the scan for connected devices on the SCSI bus. Valid values are 0 to 32. If 1 is specified, the Windows SCSI manager assumes that no SCSI targets support LUNs other than LUN 0. Otherwise, LUNs from 0 to 31 are scanned during system initialization. The data type for this value is REG_DWORD.
- **MaximumSGList**—Specifies the maximum number of Scatter/Gather elements. Valid values are 2-255. The data type for this value is REG_DWORD.
- **NumberOfRequests**—specifies the maximum number of commands that can be delivered to an SCSI card. Valid values are 16-255. The data type for this value is REG_DWORD.

To enter Windows parameters:

1. Select **Run** from the Start button.
2. Type `regedt32`, then press **Enter**.
3. Open the registry list to the following location:

   ```
   \HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\adpu320
   \Parameters\Device
   ```

   If the Parameters\Device keys already exist, skip to Step 8 below to begin entering values. If the keys do not yet exist, you need to create them by continuing with Step 4.
4. Click the **adpu320** key.
5. Select the **Add Key** from the Edit menu; type `Parameters` in the Key Name edit box. Leave the Class edit box blank.
6. Click the **Parameters** key.

7 Select the **Add** key from the **Edit** menu; type `Device` in the Key Name edit box. Leave the Class edit box blank.

To specify a certain SCSI card, append Device with the number of the SCSI card. For example, type `Device0` for the first SCSI card, `Device1` for the second, and so on. If you omit the SCSI card number, the configuration information applies to all Ultra320 SCSI cards.

8 Click the **Device** key.

9 Select **Add Value** from the **Edit** menu. In the Value Name edit box, enter one of the valid parameter values. Make sure to enter the appropriate data type for the value. To enter additional values, repeat Step 8 and Step 9.

Note: Changes made with the Registry Editor do not take effect until you shut down and then restart your system.

Using Driver-specific Parameters

To use the Registry Editor to enter adpu320m.sys driver-specific parameters that affect the configuration information for Adaptec SCSI PCI device drivers, follow the instructions below. A list of valid parameters follows:

Note: The following parameters are case-sensitive and must be entered exactly as shown. When entering multiple parameters, each parameter must be separated by a space.

- **/MAXTAGS=nnn**—specifies the tagged command queue depth per target. If a number is not specified, the tagged queue depth defaults to 32. Valid values are 1-255. The data type for this value is REG_SZ.
- **/INSTR_ERRLOG_Z=nnn**—sets the maximum number of error log entries, if /INSTRUMENTATION is enabled. If a number is not specified, the maximum number or error log entries defaults to 32. Valid values are 0-127. The data type for this value is REG_SZ

To enter driver-specific parameters:

1 Select **Run** from the Start button.

2 Type `regedt32`, then press **Enter.**

3 Open the registry list to the following location:

```
\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\adpu320
\Parameters\Device
```

If the Parameters\Device keys already exist, skip to Step 10 below to begin entering parameters. If the keys do not yet exist, you need to create them by continuing with Step 4.

4 Click the **adpu320** key.

5 Select the **Add** Key from the Edit menu; type `Parameters` in the Key Name edit box. Leave the Class edit box blank.

6 Click the **Parameters** key.

7 Select the **Add** key from the Edit menu; type `Device` in the Key Name edit box. Leave the Class edit box blank.

To specify a certain SCSI card, append Device with the number of the SCSI card. For example, type `Device0` for the first SCSI card, `Device1` for the second, etc. If you omit the SCSI card number, the configuration information applies to all Ultra320 SCSI cards.

8 Click the **Device** key.

9 Select **Add Value** from the **Edit** menu, and type `DriverParameters` in the Value Name edit box. Enter **REG_SZ** as the data type, then press **Enter**.

10 A String Editor text box appears. Enter valid parameters in the text box. When entering multiple parameters, each parameter must be separated by a space.

Note: Changes made with the Registry Editor do not take effect until you restart your system.

Troubleshooting

D

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Error Messages 56

This chapter provides troubleshooting information for your Adaptec SCSI card and its device drivers.

Troubleshooting Checklist

Most problems with using the Adaptec SCSI Card results from errors in preparing and connecting devices on the SCSI bus. If you have problems, check these items first:

- Are all SCSI cables and power cables properly connected?
- Are all SCSI devices turned on?
- Is the Adaptec SCSI Card firmly seated and secured in the PCIe expansion slot?
- Is the PCIe expansion slot compliant with PCIe Rev. 1.0 or higher?
- Are all SCSI devices on each SCSI bus assigned unique SCSI IDs?
- Is termination set correctly on all the devices?

Note: If you have problems with a specific SCSI device when other connected SCSI devices are working correctly, please contact the manufacturer of the problem device for troubleshooting information.

General Troubleshooting

The following procedures can be used for troubleshooting in all operating systems.

What if I can't load the driver and suspect that it is an resource conflict?

These are some basic steps that can assist the motherboard in correctly allocating resources to your PCI devices and/or resolve existing IRQ conflicts:

Verify that all on-board devices not being used are disabled so that the resources they are being allocated can be freed up for allocation to another device. This is accomplished through the motherboard CMOS/BIOS setup utility. For example, if you are not using the onboard sound port on your motherboard, you can usually disable this chipset and free up the resource it is currently being assigned.

What if I have devices that are showing up at the wrong speed (usually slower) when the BIOS scans the SCSI bus during boot?

- Make sure you are using the terminated cable supplied with your Adaptec kit.
- Do not mix LVD and non-LVD SCSI devices on the same channel. All Ultra320, Ultra160 and Ultra2 devices need to be on a single channel. Adding a slower device will slow down all the devices on the same bus.
- Be sure you have the connection firmly seated. A bad connection on a disk drive or other devices can cause problems talking to that device at the maximum speed.
- Try to route the cable inside the system as smoothly as possible. Avoid bending, flexing, or stretching the cable inside your system.
- If you are not booting from the SCSI card (your boot disk drive is not attached to the card) then the BIOS on the card should be disabled.

- If the card driver will not load and you do not have your boot disk drive attached to the card, try removing all the cables and devices from the card then boot up.
  - If this is successful and the driver loads, then you may have a problem with a device setting (conflicting SCSI ID numbers or Termination setting) or you have a bad cable or cable connection. Reattach devices one at a time until the problem is isolated, remembering to follow the correct termination procedure for the SCSI bus. For more information on termination, see *Terminating the SCSI Bus* on page 16.

What do I do when during boot, the Adaptec SCSI Card banner comes up but the system hangs?

Go into SCSI*Select* and choose the settings for the device that are more appropriate for the device time.

All narrow devices should have the option for Initiate Wide set to **No** and the Maximum transfer rate should be set to the fastest that the device supports, usually 20 MB/sec. (check your device documentation for this information). Setting the speed any faster for these devices will not improve performance of the device and can make the SCSI bus unstable. This can also be caused by incorrect termination, a resource conflict, or a bad device or cable.

Troubleshooting Windows

I made changes to the SCSI card configuration and Windows no longer boots!

The boot manager for Windows contains recovery logic to allow you to return to the last known good configuration. If you have changed your SCSI card configuration and Windows no longer starts:

1. Undo any hardware changes you have made to the system since it was last operational.
2. Restart the system. Watch the display carefully during startup. When you see the following message at the bottom of the screen, press **F8**:

   Starting Windows...

   This opens the Windows Advanced Options menu. Select **Last Known Good Configuration**; then select a boot profile.
3. Once your system is operational again, check all of the hardware and software configuration changes you want to make. Look specifically for conflicts with parts of the existing system configuration that are not being changed.

Troubleshooting NetWare

The error messages listed below are the messages associated with the NetWare driver. Messages are listed sequentially according to the last three digits of the error code. For example, [xxxxx080], [xxxxx081], [xxxxx082], and so on.

Note: When reporting problems to Adaptec Customer Support, be sure to include the complete error code in your problem description.

[xxxxx080] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx081] SCSI card software initialization failure

An error has occurred while the driver was setting up its internal data structures. Verify that your SCSI card is supported by this version of the driver.

[xxxxx082] Internal driver error

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx083] SCSI card not supported by this version of the driver

Your SCSI card is not supported by the driver on your system. You may have installed a new SCSI card and have not updated the driver on your system.

[xxxxx084] SCSI card software initialization failure

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx085] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx087] Internal driver error

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx088] SCSI card software initialization failure

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx089] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx096] SCSI card hardware initialization failure - possible resource conflict

The driver has attempted to initialize the SCSI card, but failed. This might suggest that the SCSI card resources (for example, IRQ) conflict with the resources of another board installed in your system.

[xxxxx099] SCSI card software initialization failure
[xxxxx09a] SCSI card software initialization failure
[xxxxx09b] SCSI card software initialization failure

An error has occurred initializing one of the driver's internal data structures for a device connected to the SCSI card. This may result in problems accessing the device. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx0ab] Driver already loaded for this SCSI card

The driver is already loaded for this SCSI card. Verify that the correct SCSI card is specified in your command line or startup file.

[xxxxx0ac] Driver already loaded for all SCSI cards

The driver is already loaded for all the supported adapters in this system.

[xxxxx0a4] SCSI bus reset by third-party hardware

Hardware such as an array enclosure may have reset the SCSI bus. This is a normal condition unless you receive additional errors.

[xxxxx0a7] Unable to allocate memory
[xxxxx0a8] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx0a9] Possible interrupt conflict

This indicates that the SCSI card IRQ conflicts with the IRQ of another board installed in your system. Check your hardware documentation for instructions on setting and changing IRQs.

[xxxxx0c9] Invalid command line parameter

A command line option for the driver is invalid. See your operating system manual for valid command line options.

[xxxxx0ca] Invalid command line syntax
[xxxxx0cb] Invalid command line syntax
[xxxxx0cc] Invalid command line syntax

The command line syntax for the driver is incorrect. See your operating system manual for entering the correct syntax.

[xxxxx07c] Unable to allocate memory
[xxxxx07d] Unable to allocate memory
[xxxxx07e] Unable to allocate memory
[xxxxx07f] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

Error Messages

Error messages generated by the Windows drivers can be viewed by opening the Windows Event Viewer error logs.

To view events generated by the driver:

1 Double-click the **Event Viewer** icon in the Administrative Tools program group.

Error messages generated by the driver show up as Event ID 11. Error messages generated by the SCSI port show up as Event ID 9.

2 To view event details, select **System Log** from the Event Viewer tree. Double-click the appropriate Windows driver event that has an Event ID of 11. (There may be none or multiple driver events.)

The top portion of the Event Detail dialog box displays information such as the time that the event was generated, the system on which the event occurred (in case of remote monitoring), and the description of the event. The Data section of the Event Details dialog box displays the error messages generated.

Click the **Words** option.

In the Data section of the dialog box, the entry in the second row and second column (to the right of the 0010: entry) lists the error message generated by the driver. The common error messages for the driver are described in *Driver Error Messages* below.

Note: The entry in the third row of the last column identifies the SCSI ID of the device originating the error.

Common Error Messages

Here is what you should do if the following messages appear on the screen at bootup:

"Device connected, but not ready"

The host system received no answer when it requested data from an installed SCSI device.

Run SCSISelect and set the Send Start Unit Command to Yes for the particular SCSI device ID. See *Starting SCSISelect* on page 36.

Ensure that the device is set to spin up when the power is switched on. The spin up option is typically set by a jumper. (refer to the documentation for the device.)

"Start unit request failed"

This message can appear if the option to send Start Unit Command is set to Yes and device is not a disk drive. If this is the case, then change the setting to No in SCSISelect for the device.

The SCSI card BIOS was unable to send a Start Unit Command to one of the installed SCSI devices. Run SCSI*Select* and disable the Send Start Unit Command for the device.

"Time-out failure during..."

An unexpected time-out occurred:

- Verify that the SCSI bus is properly terminated.
- Verify that all cables are properly connected.
- Try disconnecting the SCSI device cables from the SCSI card and then starting the system. If the system successfully restarts, one of the SCSI devices may be defective.

Driver Error Messages

The following error messages are listed sequentially according to the last three digits of the error message. For example, [xxxxx010], [xxxxx011], [xxxxx012], and so on.

Note: When reporting problems to Adaptec Customer Support, be sure to include the complete error message in your problem description.

[xxxxx004] Command completed with error

[xxxxx005] Command completed with error

[xxxxx006] Command completed with error

A request issued to a target device completed with indication that there is an error. In most cases, the error is recovered and normal operations continues.

[xxxxx010] Error issuing command

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

[xxxxx011] Error issuing command

The requested command is not supported by this driver.

[xxxxx012] Error issuing command

[xxxxxx99] Error issuing command

The driver does not recognize the target device.

[xxxxx021] Target device protocol error

An unexpected event occurred during data transfer between the SCSI card and target device. Normally, this indicates a faulty or noncompliant target device.

[xxxxx022] SCSI card or target device protocol error

The SCSI card or target device has broken the communication protocol. A badly behaving device could cause this message to appear. Normally this is not a serious problem. If you get this message frequently over a short period of time, it could indicate that the device or system is malfunctioning. Unplug or turn off unused devices to see if the problem persists.

[xxxxx023] Target device parity error

The driver has detected a parity error by the target device.

[xxxxx024] Data overrun or underrun

The SCSI card was given more or less than the expected amount of data.

[xxxxx031] Target device queue full

The target device internal buffer is full.

[xxxxx032] Target device busy

The target device reports a Busy status. Another program may already be using this device.

[xxxxx050] SCSI card failure

[xxxxxx9A] SCSI card failure

Your SCSI card may not be properly installed or defective. Try resetting the SCSI card in the PCI slot, or try installing it a different PCI slot.

[xxxxx081] SCSI card initialization failure

[xxxxxx8A] SCSI card initialization failure

[xxxxxx83] SCSI card initialization failure

An error has occurred while the driver was setting up its internal data structures. Verify that your SCSI card is supported by this version of the driver.

[xxxxx089] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx096] SCSI card hardware initialization failure—possible resource conflict

The driver has attempted to initialize the SCSI card hardware but failed. This might suggest that an SCSI card resource (for example, an IRQ) conflicts with another board installed in your system.

[xxxxx097] Unable to allocate memory

This indicates that there may be a problem with the amount of memory installed in your system. Verify that your system has at least the minimum amount of memory required by your operating system.

[xxxxx0af] Unable to de-allocate memory that was allocated for a target device

Normally, this is not a serious problem, unless you get this message frequently over a short period of time. The memory can be reclaimed by rebooting the system.

[xxxxx0ce] Scatter/Gather limit exceeded

An I/O request packet from the system contained a Scatter/Gather element list that contained more elements than are supported by the miniport. Scatter/Gather is a list of data segments that define the entire data transfer. Scatter/Gather is a means to improve total data throughput. This error might be caused by a component external to the miniport driver, such as the operating system or an ASPI application.

[xxxxxd4] SCSI card hardware failure - SCSI card reset

The SCSI card hardware failed and the miniport driver has to reset the hardware.

[xxxxx0d6] Internal driver error

An error has occurred while the driver was setting up its internal data structures. Try installing the most up-to-date version of the driver available from the Adaptec Web site, www.adaptec.com.

Windows Error Messages

Error messages generated by the Windows driver can be viewed by opening the Windows Event Viewer error logs.

Glossary

A

active negation
Provides better noise immunity on a SCSI bus.

active termination
An active terminator uses one or more voltage regulators to produce the termination voltage, rather than using resister voltage dividers.

asynchronous data transfer
A method of SCSI data transfer which is not synchronized to a set timing interval. Faster on short cables than synchronous data transfer, it commonly achieves transfer rates of 2MB/s.

B

basic input/output system (bios)
A motherboard BIOS controls the basic functions of the system such as the keyboard, monitor, etc. The BIOS on a SCSI card is used to control SCSI disk drives and perform the disk drive boot function.

bus
A pathway for data in a system.

bus mastering
The ability to process SCSI commands on the SCSI card due to its built-in processor without using the system's CPU.

C

channel
Any path used for the transfer of data and control information between storage devices and a storage controller or I/O SCSI card. Also refers to one SCSI bus on a disk array controller.

D

device driver
A software program stored on a PC's fixed disk and loaded into memory at boot time that enables a PC to communicate with peripheral devices such as fixed disk drives and CD-ROM drives.

disk drive

Physical disk drive. Randomly accessible, rewriteable data storage device. Also called hard disk, hard drive, or hard disk drive.

E

event
Notification or alert from the system, indicating that a change has occurred.

event log
File used to maintain information about prior controller activities or errors.

I

Input/Output (I/O)
An operation, program, or device that enters data into or extracts data from a system.

L

Low Voltage Differential (LVD)
Introduced with Ultra2 SCSI, and further enhanced with Ultra160 and Ultra320 SCSI, LVD technology enables data transfer to 320MB/s and supports cable lengths to 12 meters.

Q

Quick Arbitration Select (QAS)
An Ultra320 SCSI feature that improves the control release between SCSI devices, reducing command overhead

S

SCSI bus
A SCSI card and one or more SCSI peripherals connected by cables in a linear chain configuration. The SCSI card may exist anywhere on the chain, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using multiple SCSI cards.

SCSI card
An adapter card that includes all of the I/O logic, software, and processing to manage the transfer of information between the host computer's bus and devices via a SCSI bus.

SCSI device
A device such as a SCSI card board, fixed disk drive, or CD drive that is an initiator or a target or both, and is attached to a SCSI bus cable.

SCSI ID
A unique identification number used for each device on the SCSI chain.

Small Computer System Interface (SCSI)
The technology that connects various devices to PCs using a SCSI card that fits inside a system.

T

termination
A feature that stops the data signal at the beginning and the end of the SCSI bus. The first and last devices on the SCSI bus must be terminated.

throughput
A term used to describe the amount of data which can be processed by a system in a given amount of time.

W

Wide SCSI
A SCSI protocol that allows 16- and 32-bit data transfers.

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hard disk, hard disk drive, hard drive. *See* disk drives

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